Indian timbers for divers uses would require years of work conducted by a number of investigators. Mr. Pearson's is pioneer work rather aiming to arrive at some practical conclusions within a time corresponding with the urgency of India's needs. But it would appear eminently desirable to accelerate and extend Mr. Pearson's work by the employment of a staff of investigating experts, in view not only of the results that he has already obtained, but also of the possibility that in India it may often be commercially more profitable to cultivate rapidly growing timber trees the wood of which is perishable and of low quality, but capable of being cheaply preserved by antiseptic treatment, than to grow trees of slower growth the timber of which is superior in quality and in durability. PERCY GROOM.

PROF. RIGHI'S RESEARCHES.

I Fenomeni Elettro-Atomici sotto l'Azione del Magnetismo. By Prof. A. Righi. Pp. xvi+435. (Bologna: Nicola Zanichelli, n.d.) Price 17.50 lire.

IN this volume Prof. Righi gives a summary of his researches on the effect of a magnetic field on the electric discharge. These researches have been mainly concerned with three effects: the change in the potential required to start the discharge, the change in the appearance of the charge at low pressures, and the mechanical forces acting on bodies in the neighbourhood of the discharge. In all three branches of his study he has recorded a large number of interesting and suggestive facts, which deserve the close attention of all students of physics; if they have not received the attention they deserve, it is largely because Prof. Righi has tended to describe his work in terms of theories which others who have pursued parallel investigations have been unable to accept.

A review is not a suitable medium for scientific discussion, and any detailed criticism of Prof. Righi's views would be out of place. But perhaps it may be useful to record some questions which inevitably occur to a reader of the chapter which deals with the effect of the magnetic field on the discharge potential, for this matter has been discussed less thoroughly than the theory of "magnetic rays" on which Prof. Righi bases his interpretation of the second group of phenomena.

Prof. Righi found that a magnetic field, whether parallel or perpendicular to the electric field, may produce either an increase or a decrease in the discharge potential. He asserts that the "accepted theory," which attributes the effect of the magnetic field to a change in the path of the ions, is inadequate to account for such a difference in the sign of the effect. As a matter of fact, there is no accepted theory which predicts satisfactorily the discharge potential in terms of the paths of the ions, even when there is no magnetic field. Changes in the discharge potential due to added electric fields (such as are produced by bringing an insulated body near to one electrode of a tube at low pressure) are at present inexplicable except in the most vague and general way; so long as such changes remain unexplained, it is quite impossible to prove that the change in the paths of the ions produced by a magnetic field must affect the discharge potential in one sense rather than the other. Prof. Righi, on the other hand, asserts that a theory which considers only the path of the ions after they are separated must predict that a transverse magnetic field will produce an increase in the discharge potential. In order to explain the occurrence of a decrease in certain conditions, an additional hypothesis is required; that which he suggests is based on the action of the field on the atom before it is ionised; he suggests that the field increases the radius of the electronic orbit in the atom, and so decreases its stability.

The first question which arises naturally is how Prof. Righi arrives at a result so directly contrary to that on which Langevin's theory of diamagnetism is based; according to the new theory, all atoms ought to be paramagnetic. The second is why he assumes, without proof, that an increase in the radius of the orbit means decreased stability. The third is whether he has attempted to calculate numerically the change predicted by his theory in the orbit; if he will do so, he will find that the change in the orbit produced by such fields as are concerned here is much too small to be likely to lead to any important change in the energy of ionisation. The fourth is why he has not attempted to apply one of the usual methods for measuring the energy required for ionisation to test his theory—and so on.

To these questions no answers are given in the volume before us. The author seems to us generally to be apt to seize with too great readiness on any explanation which will account for facts immediately under his notice, without considering with due care how it may fit in with facts less immediately obvious, and too ready to be content with qualitative explanations when quantitative explanations are required; for the same features are to be found in his treatment of the other two effects which he has studied, though they are less noticeable in his work on the "magnetic rotations" of bodies near or immersed in the discharge. They are less noticeable because the explanations which he offers are less novel. The phenomena which he describes are, as he recognises, direct consequences of the fundamental laws of electromagnetism; the criticism here would be rather that he treats individually and with unnecessary detail facts which are all illustrations of a single recognised principle. In particular, the explanation which is offered of the Hall effect, on the analogy of the "magnetic rotations," appears to differ in no essential way from that expounded in many text-books.

Perhaps a criticism of this kind is unjust, for Prof. Righi explains that he is not writing for the expert, but for the reader who wants to bring his knowledge of physics up to date. He inserts an introductory chapter for the benefit of such a

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reader, giving a brief history of the whole development of electrical theory during the past century. It is always hard to lay down precisely the limits of the knowledge of the general reader; we confess that we should be surprised if anyone could be discovered who could find both something new in the first chapter and something comprehensible in the others; but on this matter the opinion of so practised a writer as Prof. Righi is not lightly to be disputed. However, we must insist that, in addressing the general reader, an author undertakes certain responsibilities. If he addresses an expert audience, he can do no harm to anyone but himself if he does not give as much weight and prominence to the views of those who differ from him as to his own; if he addresses those who are not experts, he has not the same liberty of choice in this matter. Judged on this principle, Prof. Righi's treatise will scarcely pass the test; we do not think he offers his readers a fair chance of deciding between him and his critics.

From the excellent quality of type and paper, we conclude that Italy is free from war-time restrictions, which affect our own publications so adversely. But, then, what excuse is to be offered for the absence of an index or any adequate summary of contents? N. R. C.

OUR BOOKSHELF.

Pharmacy, Theoretical and Practical, including Arithmetic of Pharmacy. By Prof. Edsel A. Ruddiman. Pp. vi+267. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1917.) Price 8*s*. 6*d*. net.

The object of this little work is to present in as few words as possible essential facts which every pharmacist should know. The book is divided into three sections, viz. arithmetic of pharmacy, theoretical pharmacy, and practical pharmacy. The first treats of weights and measures, and contains a number of arithmetical calculations of a very elementary nature. Theoretical pharmacy is discussed in fifty-five pages, which, it must be admitted, would be a very meagre allowance if the subject were treated in any detail; that, however, is not the case, as it is intended that the book should be used in conjunction with the United States Pharmacopœia or the National Formulary. Practical pharmacy is dealt with in a similar manner; formulæ for the various preparations considered are not given, the author confining himself to notes on the precautions to be taken, the reactions that occur, and so on.

The work contains a good deal of information in a small compass, and it certainly comprises many essential facts that every pharmacist should know. It is not, and apparently is not intended to be, a work from which pharmacy should be studied, but is rather a summary of facts such as a student would take note of during a course of lectures and demonstrations in pharmacy. Elementary students and students revising their work before examination would undoubtedly find it useful.

Afforestation. By John Boyd. Pp. 39. (London: W. and R. Chambers, Ltd., 1918.) Price 1*s*. net.

In this small brochure Mr. Boyd deals with the afforestation question as it now presents itself to this country. As he correctly remarks, if, after the troubles we have experienced during the past four years in providing the timber required for effectively waging the war, we have not learned our lesson we are not likely ever to do so. After briefly describing the extensive forests which existed in Scotland, now replaced by bare hill- and mountain-sides, the author points out the great dependence of the community upon the products of the forest, both in their everyday life and in industries. The great value of forestry to agriculture, and the manner in which the small holding can be placed on a sound footing by being associated with forestry, are dealt with in some detail. Mr. Boyd, with considerable practical experience of the trouble caused, speaks with authority on the game question in its application to forestry, and his remarks on rabbits, black game, red deer, and so forth are worthy of study. Some practical suggestions are made with reference to the ground to be taken up for planting, natural herbage forming a guide for the classification of areas. The author concludes with a few notes on various trees likely to be useful for afforesting waste lands.

A Manual of Elementary Zoology. By L. A. Borradaile. Second edition. Pp. xiv+616. (London: Henry Frowde, and Hodder and Stoughton, 1918.) Price 16*s*. net.

In this new edition there are, besides smaller additions, three new chapters dealing respectively with protozoa as parasites of man, with nematodes, and with cold-blooded vertebrates. In the first of these chapters a short account is given of Entamœba, Balantidium, Trypanosoma, and Plasmodium, and of their modes of transmission. There would seem to be no sound reason for employing the name *Entamoeba dysenteriae* instead of the well-known *E. histolytica,* especially in a junior students' text-book. In the chapter on nematodes the author gives an account of Ascaris, a summary of the principal types of life-history met with in the group, and a short statement of the special characters of parasites. In the account of *Filaria bancrofti* it should have been stated that the larvæ taken up by mosquitoes finally reach the labium (proboscis), and not the salivary glands (as stated on p. 304). In the chapter on cold-blooded vertebrates the figure of the cranial nerves of the skate is not correct in certain particulars. The outer buccal nerve (part of the seventh cranial nerve) is labelled wrongly as the maxillary branch of the fifth nerve, and the real maxillary is not labelled. The direction of the internal mandibular nerve and the external mandibular are not well shown. But these are only small blemishes. The book is excellently illustrated and written with a broad outlook.

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